

What is claimed is

1 1. A cathode-ray tube device comprising:
2 a phosphor screen; and
3 a cold cathode electron gun that includes
4 (a) a cold cathode having a field emitter array that
5 emits a beam of electrons toward the phosphor screen, and
6 a gate electrode that controls the emission,
7 (b) a first grid electrode that is positioned between
8 the cold cathode and the phosphor screen,
9 (c) a second grid electrode that is positioned between
10 the first grid electrode and the phosphor screen,
11 (d) an electron speed control unit operable to accelerate
12 the electrons that have passed through the gate electrode,
13 by a greater degree as a beam current carried by the beam
14 of the electrons is larger, and
15 (e) a lens strength control unit operable to enhance
16 a lens strength of an electron lens that is formed by the
17 gate electrode, the first grid electrode, and the second grid
18 electrode, by a greater degree as the beam current is larger.

1 2. The cathode-ray tube device of Claim 1,
2 wherein a distance from the gate electrode to one edge
3 of the first grid electrode closer to the phosphor screen
4 in a thickness direction of the first grid electrode is in

5 a range of 0.10 to 0.35 mm inclusive.

1 3. The cathode-ray tube device of Claim 1,
2 wherein the first grid electrode has a through-hole that
3 allows the beam of the electrons to pass through, and
4 a diameter of the through-hole is in a range of 0.15
5 to 0.60 mm inclusive.

1 4. The cathode-ray tube device of Claim 1,
2 wherein a potential of the first grid electrode is lower
3 than a potential of the gate electrode, regardless of an amount
4 of the beam current, and
5 the potential of the gate electrode is higher as the
6 beam current is larger.

1 5. The cathode-ray tube device of Claim 1,
2 wherein the cold cathode includes a peripheral focusing
3 electrode that is provided on a periphery of the gate electrode,
4 that has a thickness substantially equal to a thickness of
5 the gate electrode, and that has a lower potential than the
6 gate electrode.

1 6. The cathode-ray tube device of Claim 5,
2 wherein the peripheral focusing electrode and the first
3 grid electrode are integrally formed.

1 7. The cathode-ray tube device of Claim 1,
2 wherein the lens strength control unit enhances the lens
3 strength to form a crossover in the beam of the electrons,
4 at one side of the gate electrode closer to the phosphor screen.